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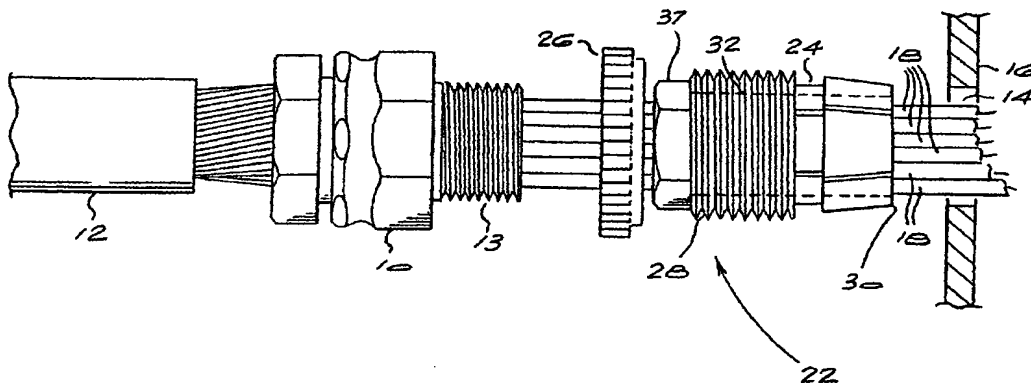
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(54) Title: A CONNECTOR FOR ELECTRICAL CABLES



(57) Abstract: This invention relates to a connector for connecting an electrical cable or conduit to an aperture in the wall of an enclosure. The connector includes a connector portion having a first end, a second resiliently deformable end, and an internal passage extending between the first end and the second end through which electrical wires from the electrical cable or conduit may extend. The first end has an internal thread to be fastened onto an external thread on a cable gland. The second end includes a plurality of tongues that are arranged to be pushed through the aperture in the wall and engage with the edge of the aperture in a locking fashion.

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A CONNECTOR FOR ELECTRICAL CABLES**BACKGROUND TO THE INVENTION**

THIS invention relates to a connector for electrical cables.

Electrical cables are usually connected to an enclosure, such as a junction box, by way of a cable gland. A cable gland is attached to the end of a length of cable, with wires from the cable extending through the gland. The gland is also provided with an external thread, which extends through an aperture in the wall of an enclosure. The gland is fastened onto the enclosure by way of an internally threaded nut which is fastened onto the external thread of the gland, inside the enclosure. A problem with this type of gland is that it is difficult and often dangerous to fasten and remove the nut from the gland, within the confines of the enclosure.

It is an object of this invention to provide an improved connector for electrical cables.

SUMMARY OF THE INVENTION

According to the invention there is provided a connector for connecting an electrical cable or conduit to an aperture in the wall of an enclosure; the connector including a connector portion having a first end which is arranged to be connected to the end of a length of electrical cable or conduit, a resiliently deformable second end which is arranged to engage lockingly with the aperture in the wall of the enclosure, and an internal passage extending between the first end and the second end through which electrical wires from the electrical cable or conduit may extend.

Advantageously, the first end of the connector portion includes an external thread, and the connector further includes a locking ring having an internal thread which is arranged to be fastened on to the external thread of the connector portion.

The second end of the connector portion typically includes at least two tongues, preferably at least four tongues, extending from the connector portion, wherein the tongues are arranged to be pushed through the aperture in the wall and engage with an edge of the aperture in a locking fashion.

Advantageously, each tongue is provided with a groove at the base thereof and the edge of the aperture is arranged to engage with the groove in each tongue in a locking fashion.

Typically, the aperture in the wall is circular and the tongues are arranged to define a frusto conical shape.

Each tongue may have a protrusion at the tip thereof, for engagement with the electrical cable.

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The connector may include a compression seal and an internally threaded locking nut which is arranged to be connected to the external thread of the connector portion, to lock the connector portion via the compression seal to an electrical cable passed through the connector portion.

Advantageously, the first end of the connector portion is internally threaded so that it may be fastened onto an external thread on a cable gland connected to the end of a length of electrical cable.

The connector may further include an adapter having a first end which is arranged to receive and engage with the second end of the connector portion of the connector in a locking fashion, a second end having an externally threaded spigot which is arranged to be screwed into an internally threaded aperture in the wall of the enclosure, and an internal passage extending between the first end and the second end thereof through which electrical wires from the electrical cable or conduit may extend.

The connector portion of the connector is preferably made from a plastics material such as nylon or polyvinyl chloride.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a side view of a connector according to a first embodiment of the invention together with a cable gland connected to the end of a length of armoured cable;

Figure 2 is a pictorial view of a connector portion of the connector shown in Figure 1;

- Figure 3** is a side view of Figure 1, with the components of the connector connected together;
- Figure 4** is a side view of a connector according to a second embodiment of the invention connected to the end of a length of an electrical conduit;
- Figure 5** is a partly cut-away side view of an adapter for the connector shown in Figure 1; and
- Figure 6** is a side view of a connector according to a third embodiment of the invention connected to a length of electrical cable.

DESCRIPTION OF EMBODIMENTS

Figure 1 shows a prior art cable gland 10 attached to an end of a length of armoured cable 12. The cable gland 10 could also be any other type of electrical cable gland, such as a PVC compression gland connected to the end of a length of ordinary electrical cable. The cable gland 10 is made from metal and includes an externally threaded portion 13 which would usually extend through an aperture 14 in the wall 16 of a closure such as a junction box where it would be fastened in place by way of a nut (not shown). It will be noted that electrical wires 18 from the armoured cable 12 extend through the gland 10, through the aperture 14 and into the enclosure.

According to a first embodiment of the invention there is provided a connector, indicated generally by the numeral 22, for connecting the gland 10 to the wall 16 of the enclosure. The connector 22 includes a connector portion 24 and an internally threaded locking ring 26. The connector portion 24 and locking ring 26 are made from a plastics material such as nylon or polyvinyl chloride (pvc).

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The connector portion 24 of the connector 22 has a first end 28 for engagement with the gland 10 and a second end 30 for engagement with the aperture 14 in the wall 16 of the enclosure. The connector 24 also has an internal passage 32 through which the wires 18 from the armoured cable 12 extend.

Referring to Figure 2, the first end 28 of the connector portion 24 of the connector 22 includes an internally threaded aperture 34 which is arranged to fasten to the external thread 12 on the gland 10 (see Figure 1). The first end 28 of the connector portion 24 of the connector 22 also has an external thread 36 which is arranged to engage with the internally threaded locking ring 26 shown in Figure 1. In this embodiment, the first end 28 of the connector portion is also provided with an integral hexagonal nut head 37. The second end 30 of the connector portion 24 of the connector 22 is resiliently deformable and is arranged to engage in a locking fashion with the aperture 14 in the wall of an enclosure 16 (see Figure 1). In this embodiment the aperture 14 is circular in shape. The resiliently deformable second end 30 is frusto conical in shape and includes four tongues 38 which define a groove 40 at the base of the tongues 38. Each of the tongues 38 tapers inwardly.

Referring to Figure 3, in use, the connector portion 24 of the connector 22 is screwed onto the external thread 13 of the gland 10. The connector portion 24 may be tightened on to the gland 10 by holding the gland 10 and tightening the connector portion 24 with a spanner attached to the hexagonal nut head 37. The second end 30 of the connector portion 24 is then pushed through the aperture 14 so that the edge of the aperture 14 locates within the groove 40 and is locked into the groove 40 by the flexible, resilient tongues 38. The connector 22 is then tightened onto the wall 16 by tightening the locking ring 26 onto the connector portion 24.

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It is a relatively simple matter to disengage the connector 22 from the gland 10. The locking ring 26 is loosened and the connector portion 24 may simply be screwed off the gland 10. The gland 10, together with the wires 18 can then be removed from the connector 22 and enclosure and worked on if necessary. Re-connection of the gland 10 is just a reversal of the above-described process. If necessary, the connector portion 24 of the connector 22 can be removed from the aperture 14 by compressing the tongues 38 with a set of long-nose pliers and pulling the connector portion 24 out of engagement with the aperture 14.

Figure 4 shows another embodiment of this invention. In this embodiment, the connector 22 replaces the metal gland 10, and is connected directly to the end of a length of electrical cable 12, (but which may be the end of a length of electrical conduit). The connector 22 is connected to the wall 16 of an enclosure by pushing the second end 30 through an aperture 14 until the aperture 14 engages with the groove 40 therein, and then by tightening the connector 22 onto the wall 16 by way of the locking ring 26. The connector 22 is removed by loosening the locking ring 26 and compressing the tongues 38 on the second end 30 of the connector portion 24 with a set of long-nose pliers, and pulling the connector portion 24 out of the aperture 14.

Figure 5 shows an adapter 50 for attaching a connector 22 such as that shown in Figure 1, to an aperture 14 in wall 16 of an enclosure wherein the aperture 14 has an internal thread 14A. The adapter 50 has a first end 52 which has a circular aperture 54 which is arranged to receive and engage with the second end 30 of the connector portion 24 of the connector 22. The adapter 50 has a second end 56 which includes an externally threaded spigot 58 which is arranged to be screwed into the threaded aperture 14. A passage 60 runs through the adapter 50, allowing wires from an electrical cable (not shown) to run through the adapter 50. In use, the threaded end 58 of the adapter 50 is screwed into the aperture 14 and the second end 30 of the connector portion

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24 is pushed into the aperture 54 in the adapter 50 and the connector 22 is locked on to the adapter 50 by tightening locking ring 26.

Figure 6 shows a further embodiment of the invention. In this embodiment, the connector 22 connects a length of electrical cable 12 to the wall 16 of an enclosure. The connector 22 includes a connector portion 24, and internally threaded locking ring 26, a rubber compression seal 64 and an internally threaded locking nut 66. First end 28 of the connector portion 24 has an external thread 36 which is arranged to engage with the internal threads on the locking ring 26 and locking nut 66. The second end 30 of the connector portion 24 is resiliently deformable and is arranged to engage in a locking fashion with an aperture 14 in the wall 16. The resiliently deformable second end 30 of the locking portion 24 is frusto-conical in shape and includes six tongues 38 which define a groove 40 at the base of the tongues 38. A protrusion 68 is provided at the tip of each tongue 38, for engagement with the electrical cable 12.

In use, the second end 30 of the connector portion 24 is pushed into the aperture 14 in the wall 16. The electrical cable 12 is then pushed through the connector portion 24. The locking ring 26 is tightened onto the thread 36 on the connector portion 24 and tightened against the wall 16. The tightening of the locking ring 26 against the wall 16 exerts pressure on the tongues 38 which are biased toward the electrical cable 12 and are caused to grip the cable 12. The protrusions 68 on the tongues 38 clamp into the electrical cable 12, thereby locking the cable 12 in place. The compression seal 64 is then pressed into the back of the locking portion 24 and the locking nut 66 is screwed onto the thread 36 on the locking portion 24. The locking nut 66 is tightened, causing the seal 64 to be compressed against the locking portion 24 and electrical cable 12, thereby gripping the cable 12 and locking and sealing the connector portion 24 onto the locking cable 12. This connector 22 provides a strong mechanism for connecting an electrical cable to the wall 16 of an

enclosure, which is also sealed against the environment. An added advantage is that it is a relatively simple task to remove the connector 22, by merely loosening the locking nut 66 and locking ring 26, and pulling the cable 12 out of the connector portion 24.

The connector 22 described above has many advantages over other gland fixtures known in the art. Firstly, it is easier to install and remove than the normal gland locking fixture. Secondly, the connector 22 is made from a plastics material which is insulated against electricity and thus there is no short-circuiting between the connector 22 and the wall of the enclosure. Thirdly, the connector 22 forms a seal against the wall of the enclosure and thus seals the hole in the enclosure from moisture and dust. Lastly, it is safer to install a glanded cable using the connector 22 as an electrician does not have to insert his hands into an enclosure to tighten the connector, where he may touch a live wire by mistake.

CLAIMS

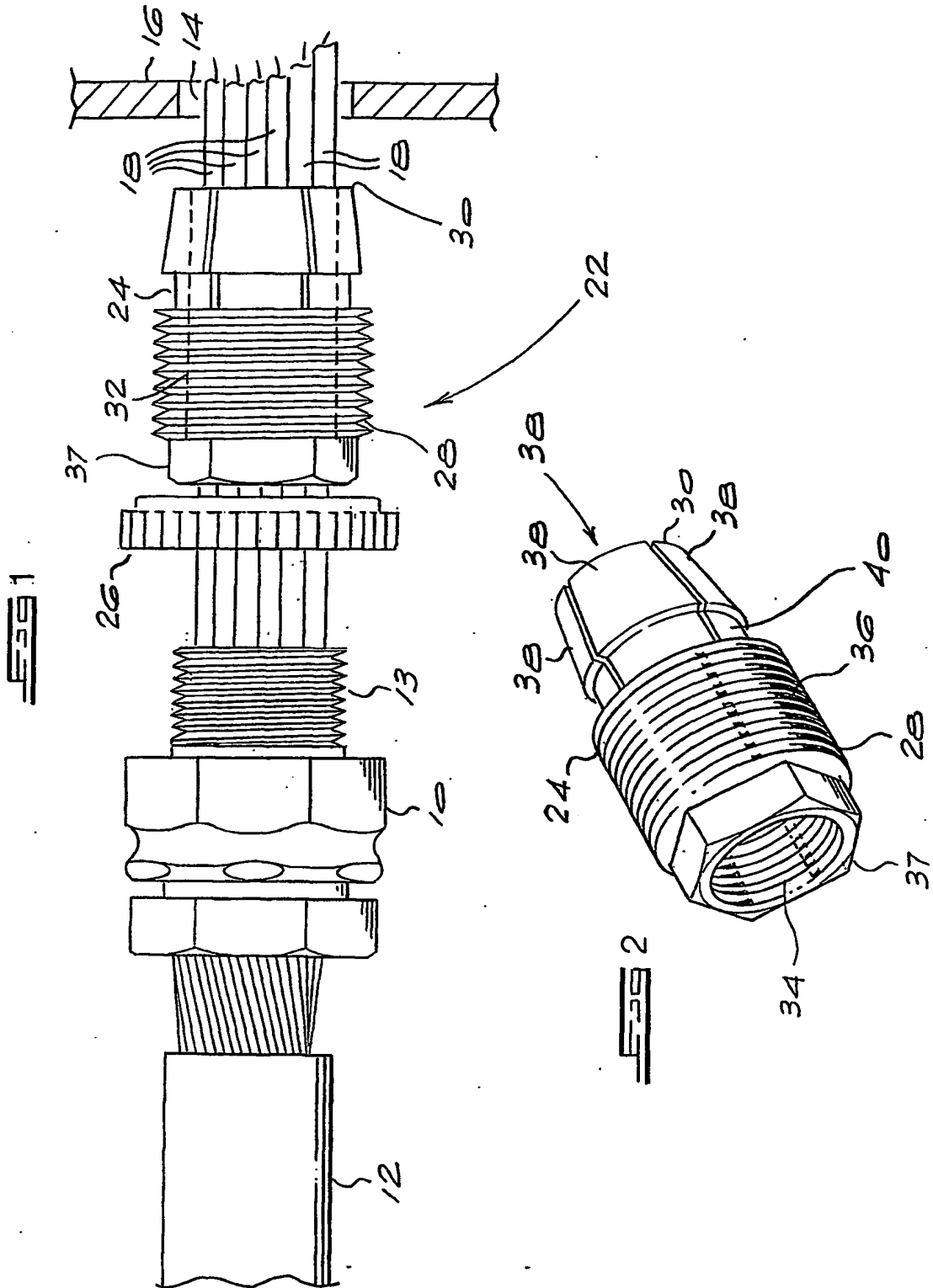
1. A connector for connecting an electrical cable or conduit to an aperture in the wall of an enclosure; the connector including a connector portion having a first end which is arranged to be connected to the end of a length of electrical cable or conduit, a resiliently deformable second end which is arranged to engage lockingly with the aperture in the wall of the enclosure, and an internal passage extending between the first end and the second end through which electrical wires from the electrical cable or conduit may extend.
2. A connector according to claim 1, wherein the first end of the connector portion includes an external thread.
3. A connector according to claim 2, wherein the connector includes a locking ring having an internal thread which is arranged to be fastened on to the external thread of the connector portion.
4. A connector according to any one of claims 1 to 3, wherein the second end of the connector portion includes at least two tongues, extending from the connector portion, wherein the tongues are arranged to be pushed through the aperture in the wall and engage with an edge of the aperture in a locking fashion.
5. A connector according to claim 4, wherein the second end of the connector portion includes at least four tongues.
6. A connector according to claim 4 or 5, wherein each tongue is provided with a groove at the base thereof and the edge of the aperture is arranged to engage with the groove in each tongue in a locking fashion.

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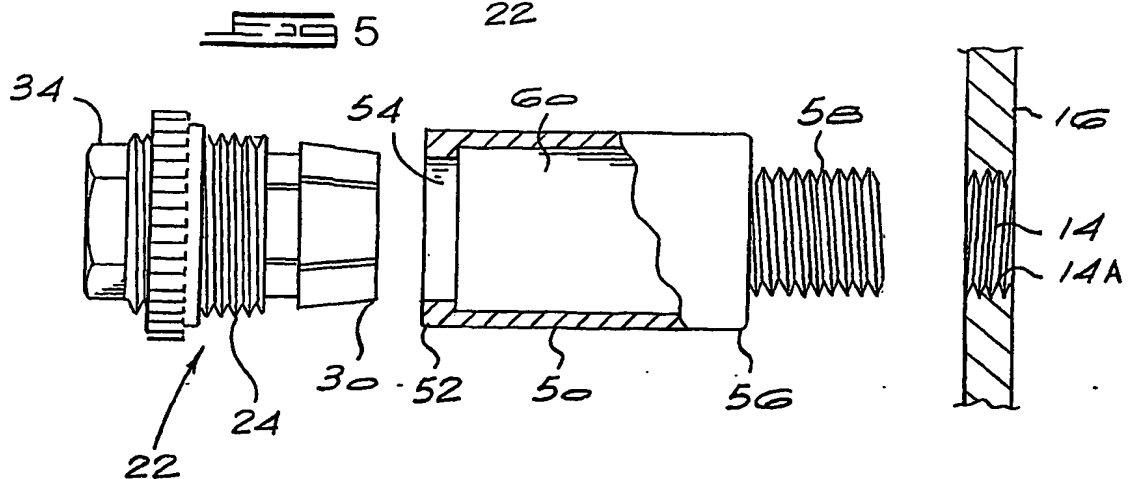
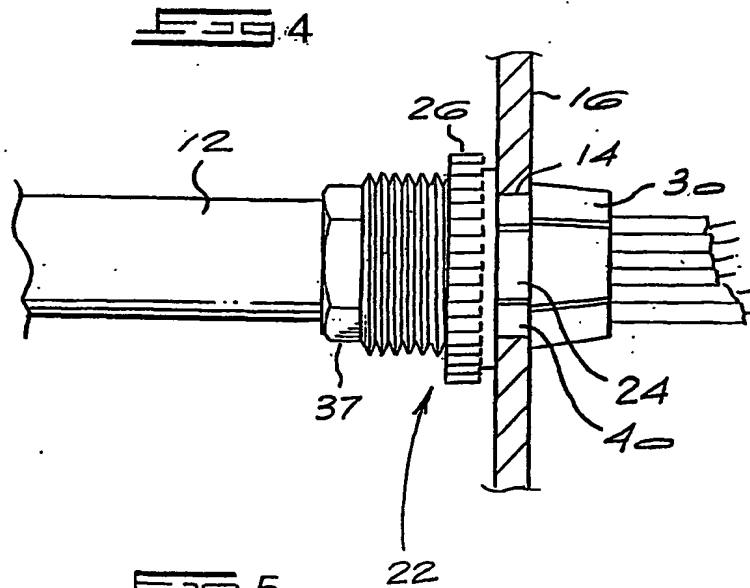
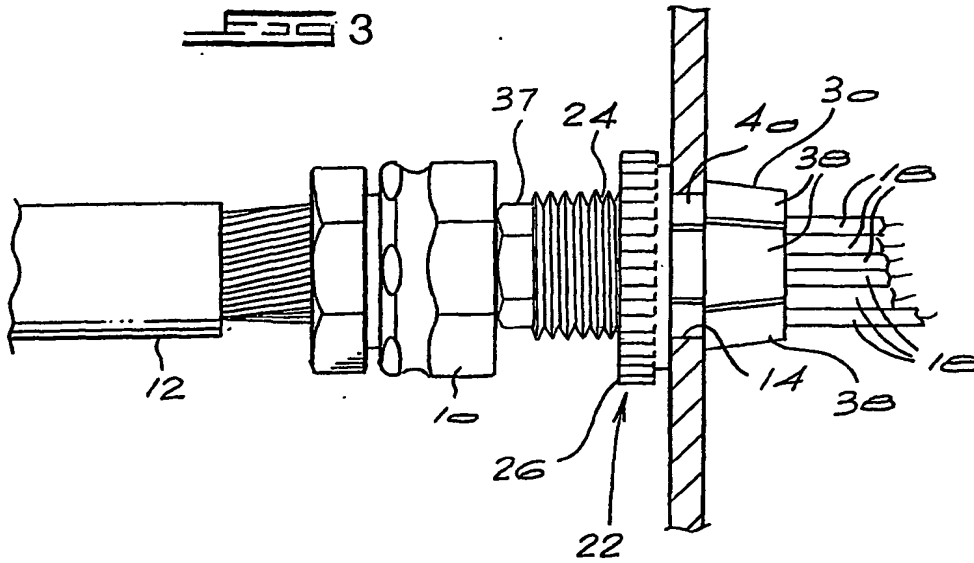
7. A connector according to any one of claims 4 to 6, wherein the aperture in the wall is circular and the tongues are arranged to define a frusto conical shape.
8. A connector according to any one of claims 4 to 7, wherein each tongue has a protrusion at the tip thereof, for engagement with the electrical cable.
9. A connector according to any one of claims 2 to 8, wherein the connector includes a compression seal and an internally threaded locking nut which is arranged to be connected to the external thread of the connector portion, to lock the connector portion via the compression seal to an electrical cable passed through the connector portion.
10. A connector according to any one of the preceding claims, wherein the first end of the connector portion is internally threaded so that it may be fastened onto an external thread on a cable gland connected to the end of a length of electrical cable.
11. A connector according to claim 1, wherein the connector includes an adapter having a first end which is arranged to receive and engage with the second end of the connector portion of the connector in a locking fashion, a second end having an externally threaded spigot which is arranged to be screwed into an internally threaded aperture in the wall of the enclosure, and an internal passage extending between the first end and the second end thereof through which electrical wires from the electrical cable or conduit may extend.
12. A connector according to any one of the preceding claims, wherein the connector portion of the connector is made from a plastics material.

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13. A connector according to claim 12, wherein the connector portion of the connector is made from nylon or polyvinyl chloride.
14. A connector substantially as herein described with reference to any one of the illustrated embodiments.

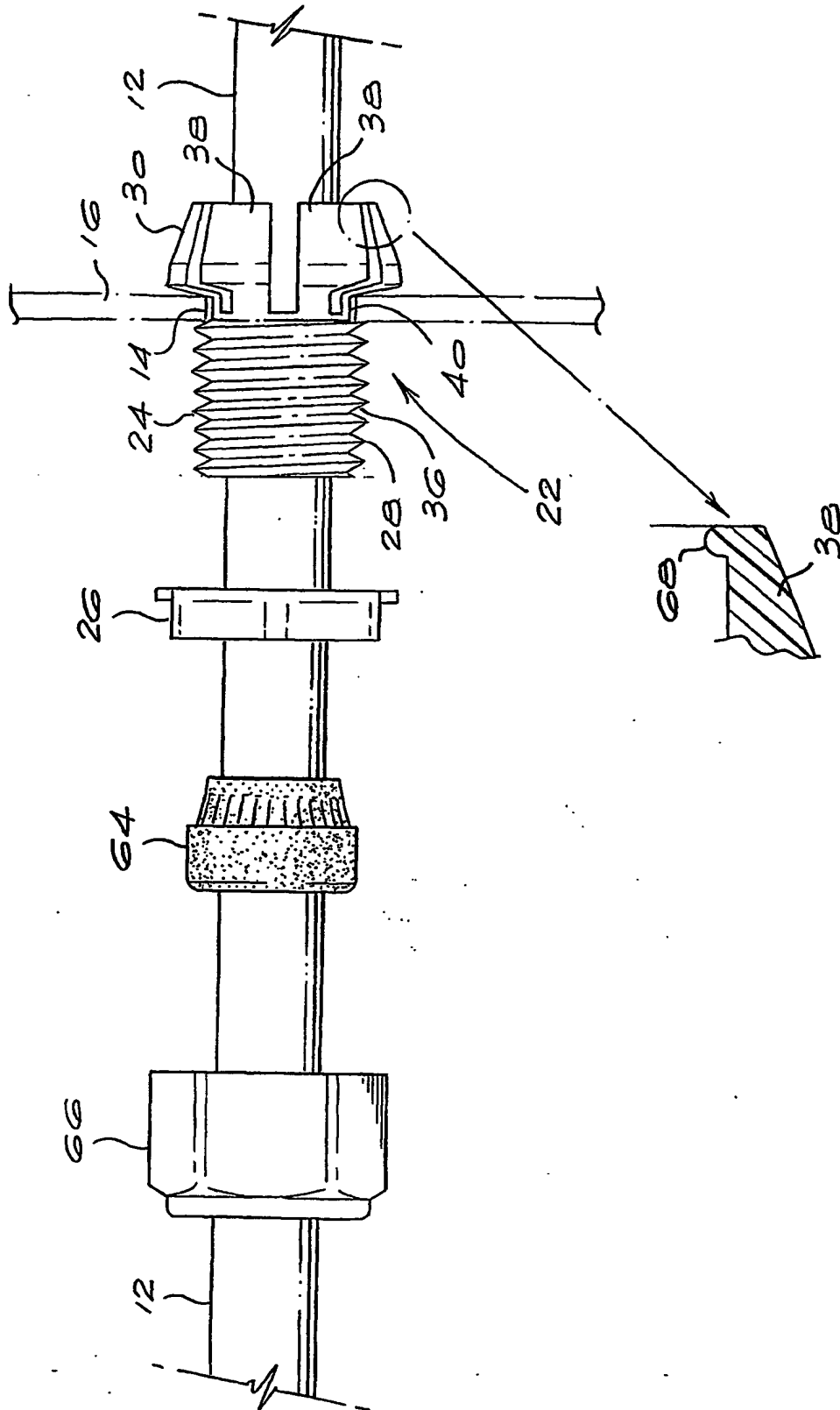


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INTERNATIONAL SEARCH REPORT

International Application No

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H02G3/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H02G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 5 285 013 A (SCHNELL ET AL.) 8 February 1994 (1994-02-08) the whole document	1,4-7, 12,14 8
X A	US 6 082 782 A (BARTHOLOMÄ ET AL.) 4 July 2000 (2000-07-04) the whole document	1,4-7,14 9
X A	GB 2 337 373 A (BICC PUBLIC LIMITED COMPANY) 17 November 1999 (1999-11-17) page 7; figure 4	1-7,14 12
X	US 5 068 496 A (FAVALORA) 26 November 1991 (1991-11-26) the whole document	1-4,6,7, 12-14

☐ Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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